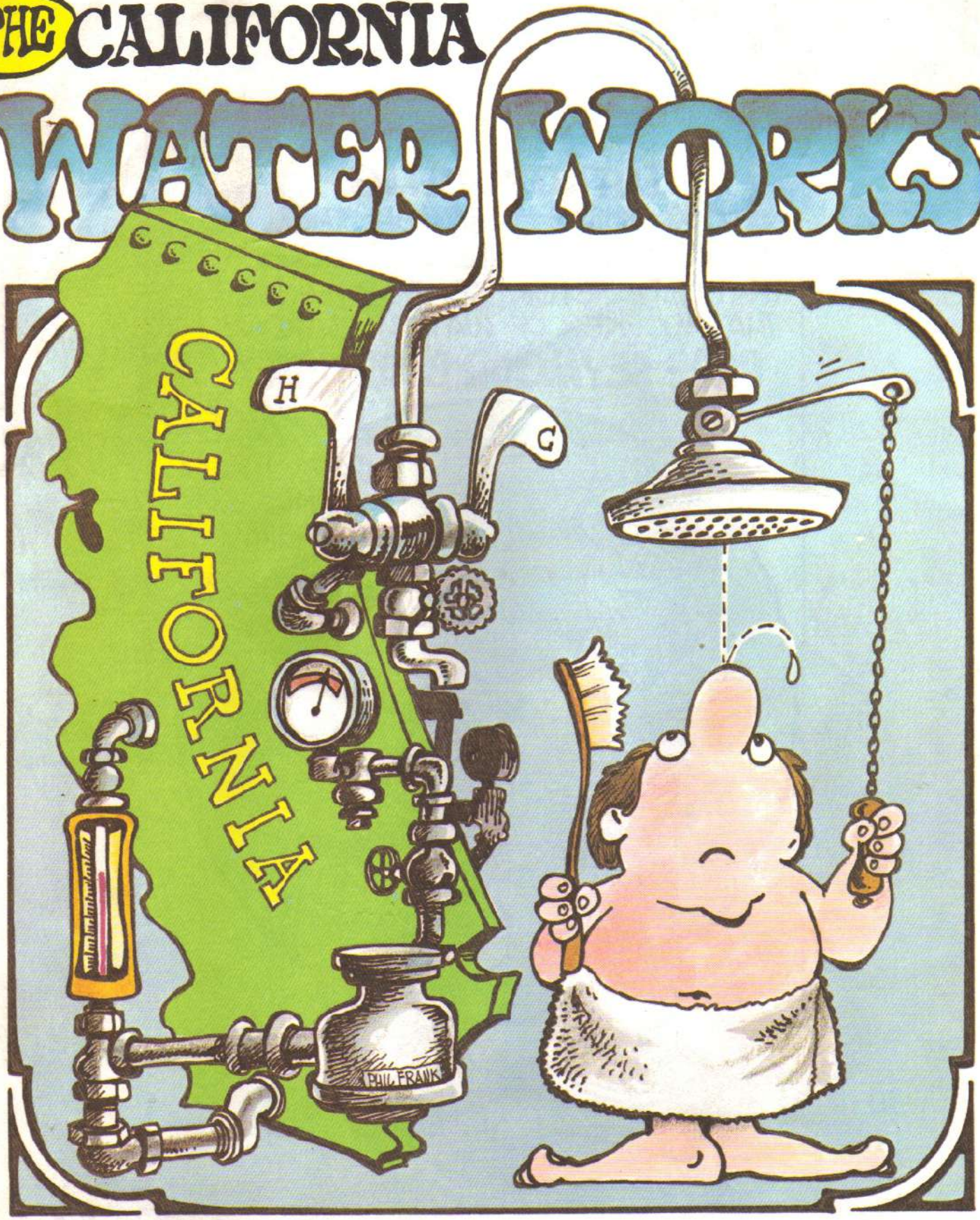
THE CALIFORNIA WATER WORKS



AND WHY IT DOES...

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INTRODUCING
OUR GUIDE THROUGH THE
CALIFORNIA WATER WORKS,
THAT OLD METER READER HIMSELF,
THAT WORKER OF WATER WIZARDRY...
PROF. SEYMOUR GOODWATER

save water
DWR

WELL, WELL, WELL —

Welcome to the wonderful, wet world of water... the most important liquid on earth, the very elixir of life.

As your kindly old professor and friendly guide, I am delighted to escort you on a personal tour of the waters of California.

But wait! I mustn't get ahead of myself. Let's start with what in the world water is, since over four-fifths of the earth's surface is covered with it.

Water is a liquid made of two atoms of hydrogen and one atom of oxygen. In addition to the wet stuff which comes out of our faucets, water can be found as a solid, when frozen as ice or snow. It can also be a vapor that rises into the air — like steam.

Water is one of the main things that makes it possible for people to live. No other planet can make that statement — at least in our solar system.

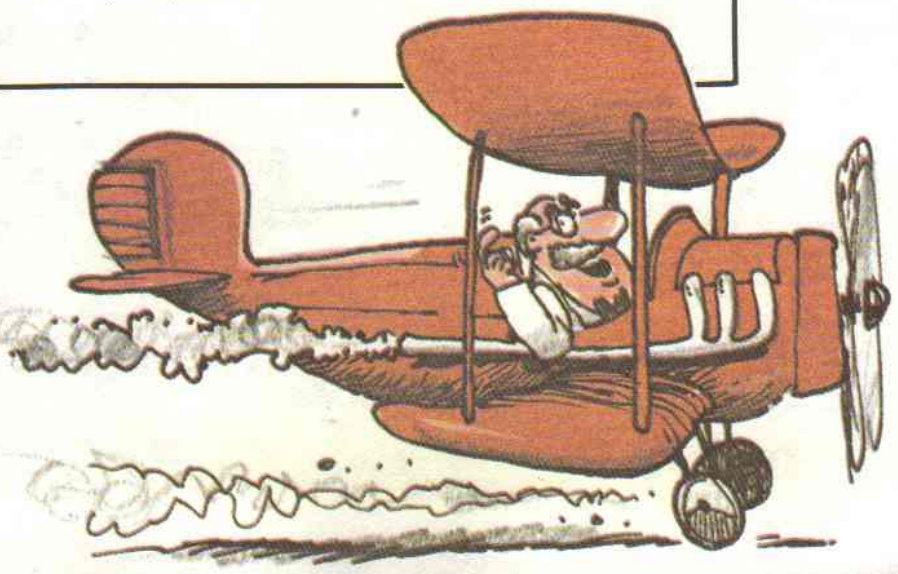
Only the earth has rivers, lakes, bays and oceans. Earth's people have learned to use water in many ways.

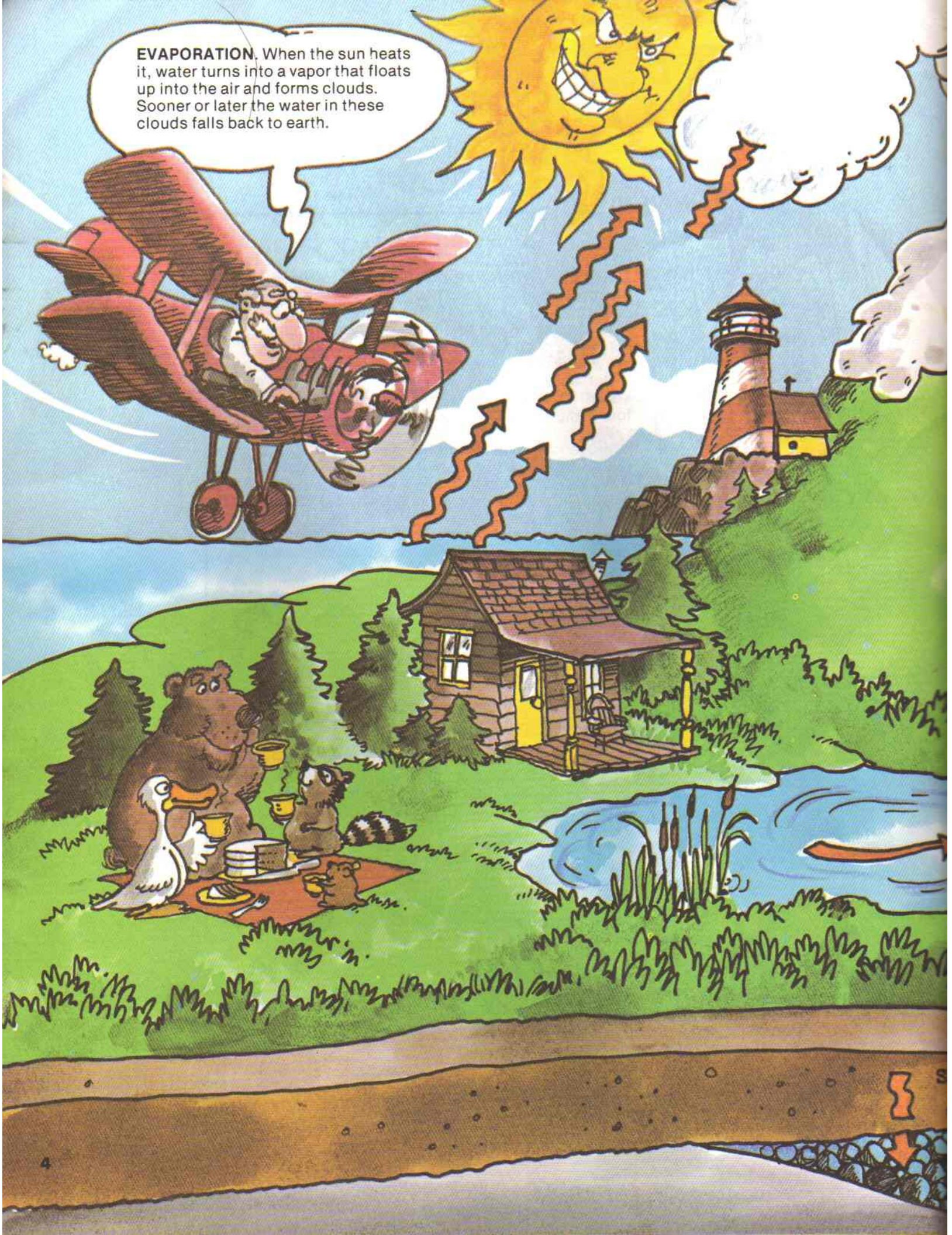
Farmers use water to irrigate the crops that feed us. People in factories use it to make the products we need. All animals on earth need water for one reason or another. People also use water to wash their clothes and dishes, and even to put out fires.

And we can have fun with water when we go fishing, swimming, skiing or ice skating.

But enough of this talk, talk, talk...let's take a ride and get a better look at the wet stuff in the Golden State.

Follow me in my biplane as we explore what is called the water cycle. This is nature's very own water sytem, which starts with...




EVAPORATION. When the sun heats it, water turns into a vapor that floats up into the air and forms clouds. Sooner or later the water in these clouds falls back to earth.

RAIN AND SNOW are what we get when the clouds finally turn the water loose. Snow is formed when the air is cold enough to freeze water into crystals, or snow flakes. Rain falls when it's not cold enough to freeze. When water evaporates, dirt and other impurities are left behind, so water from the clouds is pretty pure.

RAIN AND MELTING SNOW run into streams, rivers, lakes and on to the ocean. About 3000 years ago, humans figured out how to dam rivers and streams to make artificial lakes — called reservoirs. They also learned how to dig wells and pump out water that had soaked into the earth. They piped this groundwater — and water from reservoirs — to farms and towns for people to use.

Now that our trusty biplane is high enough, we can see that California gets its rain and snow from those clouds coming from the ocean.

The clouds first come to the hills near the coast — this is where the first rain usually falls from a big storm.

OUR NATURAL WATER SYSTEM

Then the clouds move across California until they come to the higher mountains known as the Sierra Nevada. The clouds rise above the lower hills, dumping more and more rain. This rain turns to snow in the colder air of the higher levels.

As a rule, in winter we get lots of snow in the mountains. When warmer spring weather comes the snow melts, supplying us with much of the water we need for the hot summer months.

In a normal year about 247 cubic kilometres (247 billion kilolitres) of snow and rain fall on our State. This is enough to cover all of California with about 60 centimetres of water. But of course, it doesn't, or we would have to be very tall to get around.

About two-thirds of this wet stuff is used by trees and other plants, soaks into the ground, or evaporates. Only about one-third of all our water runs off into rivers and streams in an average year.

Most of the water we do keep winds up in California's natural storage system of lakes, rivers and streams, or goes into our people-made systems of dams, reservoirs and aqueducts.

If you look over the edge of this old plane, you can see that most of our natural rivers, streams and lakes are in the north. This is because about 75 percent of the water from rain and snow runs off northern mountains.

If you look closely at where all that water is going, you'll see that nearly half of California's water flows into the great Central Valley, mainly through the Sacramento and San Joaquin rivers.

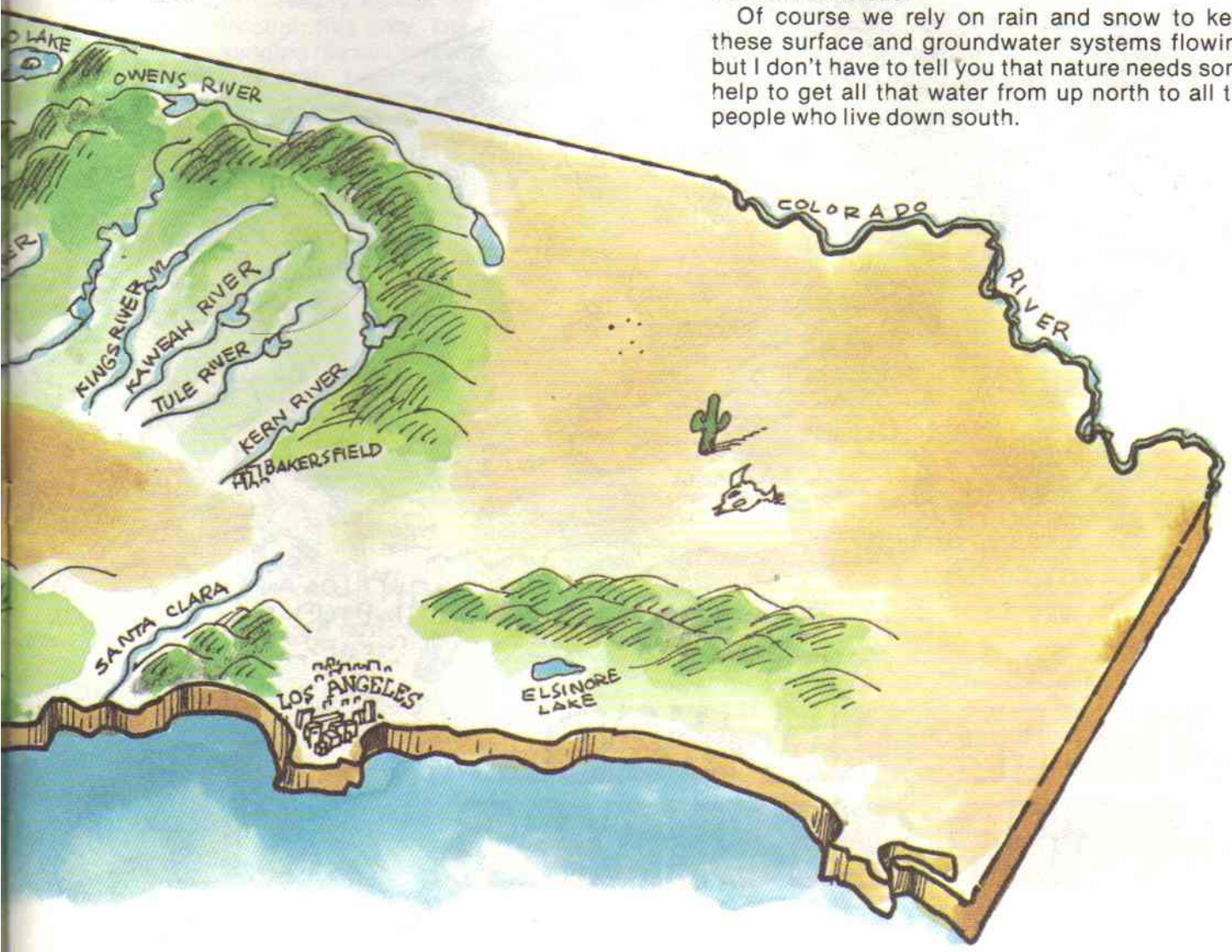
Once there were vast lakes and swampy areas in many parts of the Central Valley, but now they have all been drained and made into farmlands.

Many smaller rivers and streams also flow into this area. At the point where the rivers join to meet the salt waters of San Francisco Bay, we have what you call the Delta. Years ago, the rivers washed rich soil into the Delta, making islands that are good for farming today. Now the water flows by these islands, through sloughs and channels, on to San Francisco Bay and the ocean.

Most of the rest of California's water — about 40 percent — goes into the north coast basin, which stretches along the Pacific Ocean from Oregon to San Francisco. The Eel, Trinity and Klamath rivers are in this basin — they carry over one-fourth of California's water runoff.

Another important part of our natural water supply is groundwater. Remember I told you that this is water which has seeped into the ground? Well, it collects in underground areas of rocks and sand — known as aquifers. You can't see them from up here, but the aquifers hold huge amounts of water like giant sponges. Although we don't know exactly how much water is underground, we do know that about 40 percent of the water we use comes from wells.

Of course we rely on rain and snow to keep these surface and groundwater systems flowing, but I don't have to tell you that nature needs some help to get all that water from up north to all the people who live down south.



California usually has enough water to go around. But, like I said, about 75 percent of our rain and snow falls north of Sacramento, while about 75 percent of the State's water needs are south of there.

Furthermore, while most of the rain falls in the winter and early spring, farmers need water most in the summer.

What a pickle! But never fear — this is a job for California's people-made water works.

In order to solve the problem, people have built large systems that store water from the winter and move it to areas of need for use in the drier times of the year.

Moving our water from one place to another is old stuff. Nearly 200 years ago the Spanish missionaries dug canals that carried water from streams to nearby fields.

Then, about 70 years ago, California's big cities had to do the same thing. People needed more water than they had, so they began building water systems to get it.

Los Angeles was first. They built a 380 kilometre canal to bring water from the Owens Valley in the southern Sierra.

At about the same time, in the early 1900's, Southern California farmers needed more water too. They built canals from the Colorado River to the rich farmlands of the Imperial and Coachella valleys.

OUR PEOPLE-MADE WATER SYSTEMS

Then, in the late 1920's and 1930's San Francisco and the Oakland area outgrew their local water supplies. Aqueducts were built which brought water to these growing areas from the western slopes of the Sierra.

By the early 1940's, the Metropolitan Water District of Southern California built a 386 kilometre canal from the Colorado River to the many people of the Southland.

But even with all these efforts, there was not enough water where it was needed, so the State and Federal governments built the two biggest systems of all.

The reservoirs and canals of the State's California Water Project and the federal government's Central Valley Project were built to store water from Northern California rivers and send it southward. It goes to some heavily populated areas around San Francisco Bay, the farms of the Central Valley, and to millions of Southern Californians.

As you can see, there are a lot of reservoirs in these systems. Most of the bigger ones are in Northern California, and each of the 10 largest holds more than a cubic kilometre (1¼ trillion litres) of water.

Water from these reservoirs is released into rivers which flow into the Delta (you remember about the Delta?). Nearly half of all California's water passes through this area. The Delta is the main point for sending the water south.

Oh, before I forget, I should tell you that reservoirs do more than store water. Many have power plants which use the force of the flowing water to turn electrical generators. This gives us a clean, cheap source of electricity.

Most reservoirs are also used for fun, like fishing, boating, and maybe swimming. A lot also keep large flows of water from going down the river all at once and causing a flood.

But mainly, our reservoirs supply billions of litres of water a day to farms, homes and businesses. Among the biggest and most important federal reservoirs are Lake Shasta on the Sacramento River, Folsom Reservoir on the American River and Millerton Lake on the San Joaquin River.

The main reservoir in the California Water Project, owned by our State government, is Lake Oroville on the Feather River.

The State is also planning to build a canal around the eastern edge of the Delta. This canal will be called the Peripheral Canal. It will take fresh water from the Delta to farms and cities farther south. In addition, the Canal will release fresh water at several points in the Delta. This will keep the salty water from flowing too far inland and lowering the Delta's water quality.

Getting the water to where it is used is done with canals and aqueducts. Most of the cities along the coast, like San Diego, San Francisco and Los Angeles, use pipelines which bring water across the State. Many farmers in the San Joaquin Valley use water from irrigation canals supplied by the federal Delta-Mendota Canal.

But the biggest people-made water transport system is the California Aqueduct. It stretches 715 kilometres — all the way from the Delta to Riverside County in Southern California.

Some water is taken from the canal up north. The rest of it is pumped over the Tehachapi Mountains — about 600 metres high — by some of the biggest pumps in the world.

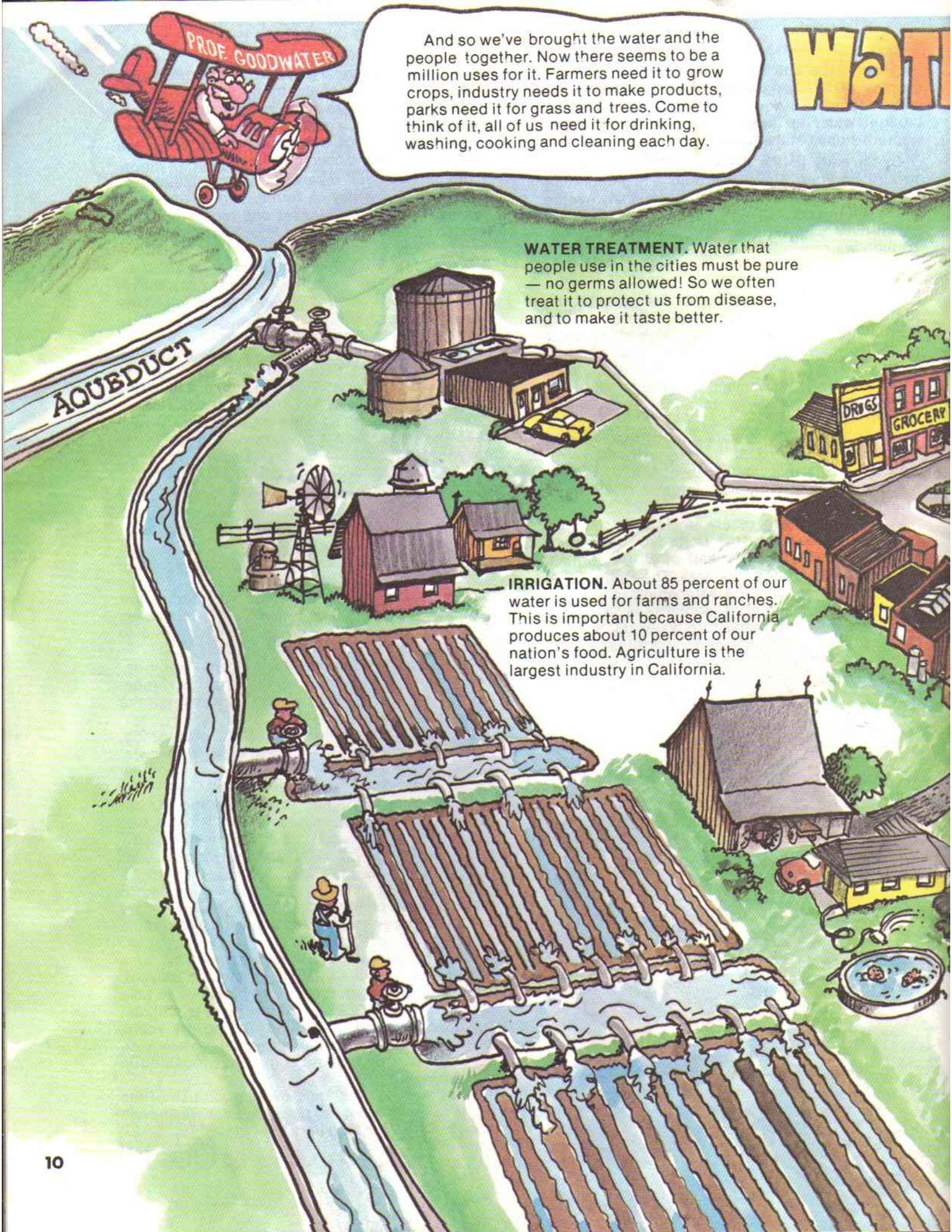
South of the Tehachapis, the canal splits, taking water to Los Angeles, several coastal cities, the Antelope Valley and the counties of San Bernardino, Riverside, Orange and San Diego.

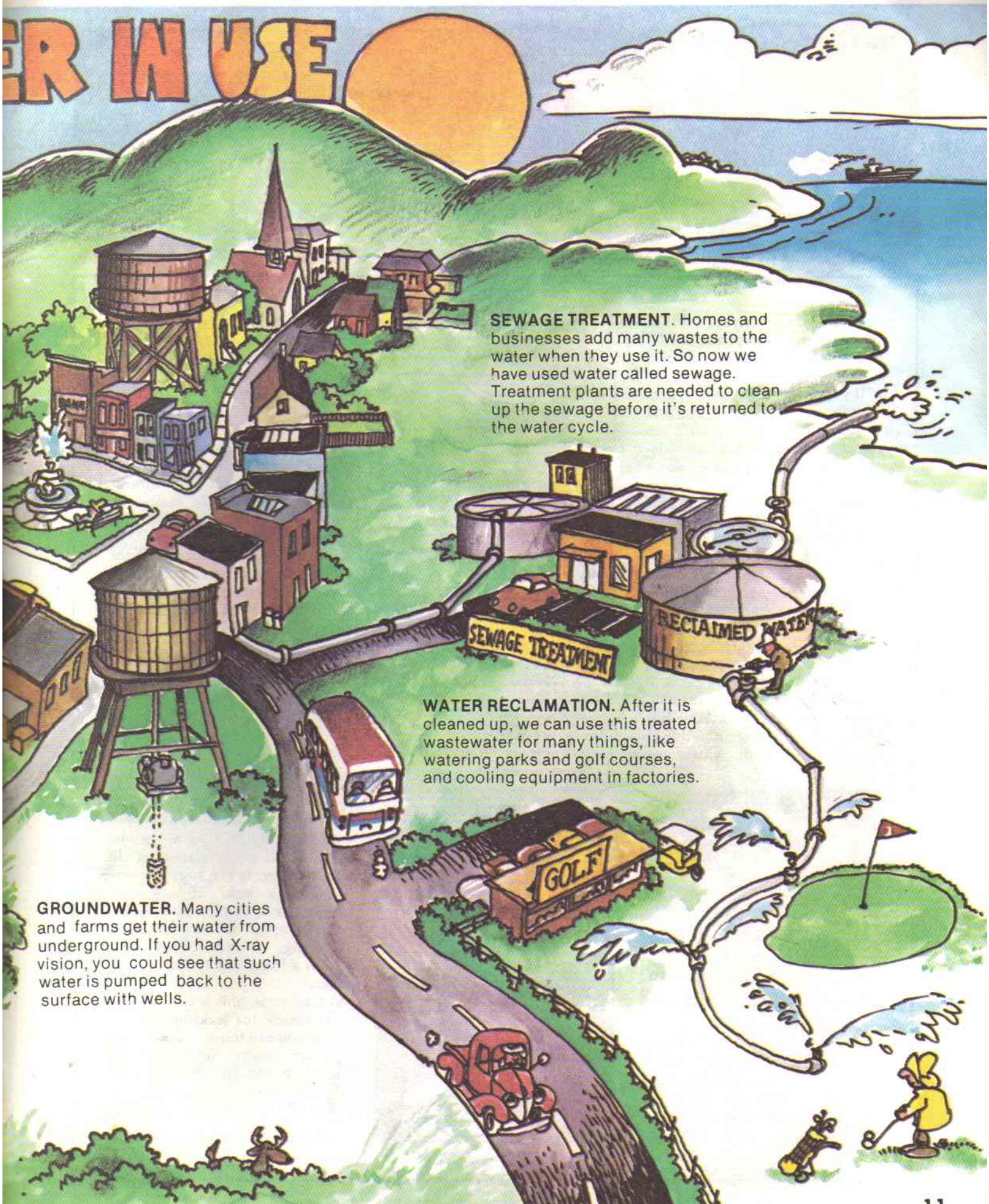
And there, my friends, you have some of California's biggest water systems. Don't forget that all of these systems rely almost as much on electricity as they do on water. That's because water can't go up hill by itself so we have to pump it.

It takes a lot of energy and a lot of money to operate these pumps. So, if we use less water we will save energy, money and water, all at the same time!

And one more thing. Our people-made systems can't make water — they only store and move it. Even with all the reservoirs and pipelines to take care of California's water needs, there is still just so much water to go around. During dry years, when only a little rain and snow fall, some reservoirs may not fill up, and some people could run short of water.

The point is, we should make good use of the water we have today, so maybe we'll have enough to go around for a long time to come.


PROF. GOODWATER
And so we've brought the water and the people together. Now there seems to be a million uses for it. Farmers need it to grow crops, industry needs it to make products, parks need it for grass and trees. Come to think of it, all of us need it for drinking, washing, cooking and cleaning each day.
WATER TREATMENT. Water that people use in the cities must be pure — no germs allowed! So we often treat it to protect us from disease, and to make it taste better.
AQUEDUCT
DRUGS
GROCERY
IRRIGATION. About 85 percent of our water is used for farms and ranches. This is important because California produces about 10 percent of our nation's food. Agriculture is the largest industry in California.

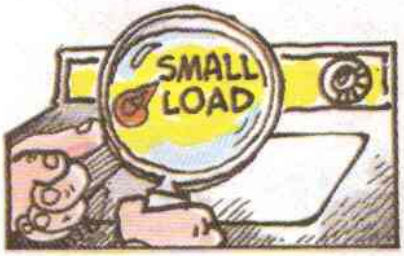

ER IN USE
SEWAGE TREATMENT. Homes and businesses add many wastes to the water when they use it. So now we have used water called sewage. Treatment plants are needed to clean up the sewage before it's returned to the water cycle.
SEWAGE TREATMENT
RECLAIMED WATER
WATER RECLAMATION. After it is cleaned up, we can use this treated wastewater for many things, like watering parks and golf courses, and cooling equipment in factories.
GOLF
GROUNDWATER. Many cities and farms get their water from underground. If you had X-ray vision, you could see that such water is pumped back to the surface with wells.

If I may interrupt for a moment, my dear professor, I'd like to say that saving water is elementary.

If you inspect my Leakstoppers Handbook, you'll discover that any amateur can spot the clues to water saving. As the famed detector of drips, I like to sneak up on my suspects and observe them in the act of grand theft. Outside his den of liquidity, the villain can often be seen watering when too much heat causes loss by evaporation, or when the wind blows water away...or — perish the thought — when plants don't even need it.

CLUE NO. 1: Water according to the needs of your plants, not just automatically. And do it in the morning, the cool of the day, when winds are calm. And furthermore, growing non-thirsty plants saves both water and work.

After checking the outside of the joint, slip inside and you'll discover Jack the Dripper is at it even in the laundry and kitchen...skimpy loads use as much water in most washers as full loads, don't you know?



CLUE NO. 2: Fill up your dishwasher and laundry machine before starting a wash. And the next time you're in the market for a new machine, get one that adjusts water use for smaller loads.

Good heavens! Look at the dripping faucet in the sink. That can waste more than 400 litres a day. It's criminal.

CLUE NO. 3: Replace worn faucet washers. You only need a screwdriver and the right size washer which costs just a few cents at any hardware store.

And now, on to the bathroom — the scene of many crimes. The problem is that the criminal keeps returning to leave the water running while shaving or brushing teeth, showering too long and flushing away facial tissues that could go in a waste basket. Clearly, he's a real three-time loser. We should send him up the river — while there's still a river.

CLUE NO. 4: Never leave the water running needlessly. When shaving, toothbrushing, filling a glass or even washing a car, shut your tap whenever you can.

CLUE NO. 5: You can get clean with a 4-5 minute shower; anything more is water down the drain. A flow restrictor or low-flow showerhead cuts shower waste, and you can save even more by turning off the shower while you lather up.

CLUB NO. 6: Don't flush the toilet just to get rid of a dead bug. And cut down on litres-per-flush with plastic bottles in the tank or a low-flow toilet.

CLUE NO. 7: One of the biggest of all water wasters is the leaky toilet. If you hear a hiss or suspect a leak, drop a little vegetable dye in the tank — if it shows up in the bowl without flushing, you're losing water from a leaky toilet. Better check it out.

Of course, this is just a beginner course for leakstoppers. I'm sure you can think of other ways to save water. Send your best solution to me, Showerlock Homes, Dept.of Water Resources, Box 388, Sacramento, CA 95802

And now, back to you, Professor!!

A WORLD WITHOUT WATER?

HAVE YOU EVER THOUGHT ABOUT..

HERE ARE SOME OF THE THINGS THAT MIGHT HAPPEN..

SOME JOKES WOULDN'T BE NEARLY AS FUNNY..

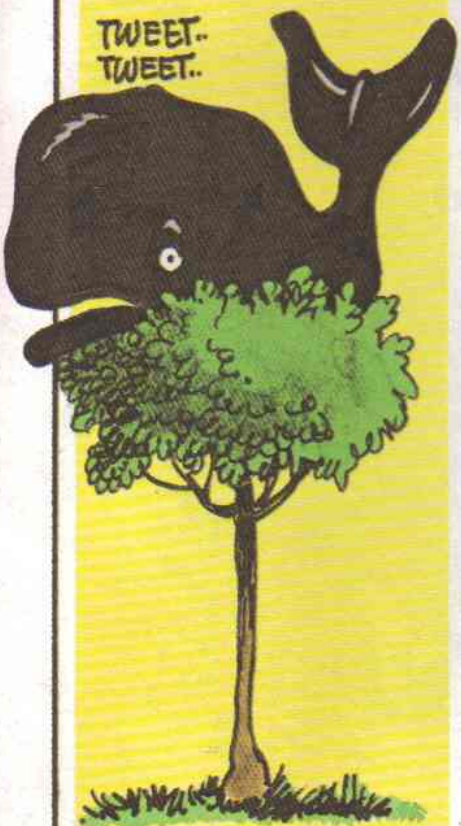
WE WOULD HAVE TO DO LIKE THE BIRDS..

.. AND TAKE DUST BATHS..

GARGLING WOULD BECOME A THING OF THE PAST..

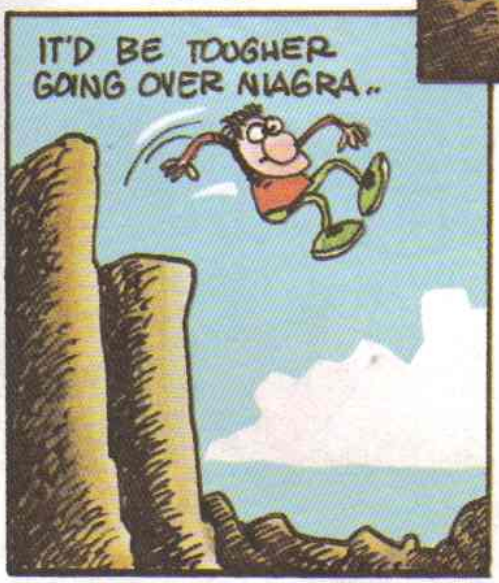
TOURS TO EUROPE WOULD BE MUCH MORE DIFFICULT...

TWEET.. TWEET..



WHALES WOULD HAVE TO LEARN TO LIVE IN TREES...

IT'D BE TOUGHER GOING OVER NIAGRA..

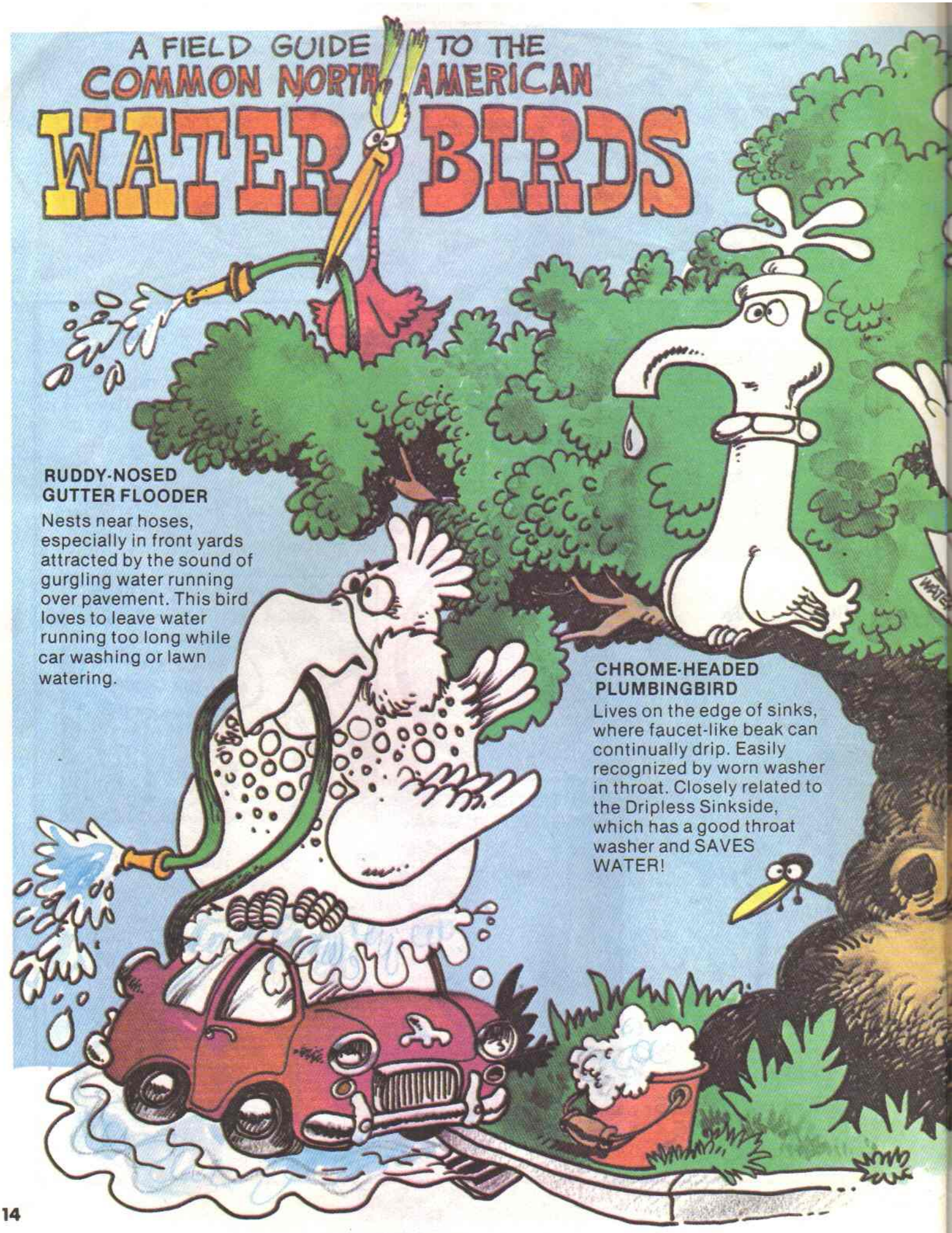


WE'D HAVE TO GET RID OF OUR:

- WATER COLORS
- UMBRELLAS
- HOT WATER BOTTLES...

WHAT OTHER CHANGES CAN YOU THINK OF ?

A FIELD GUIDE TO THE COMMON NORTH AMERICAN WATER BIRDS

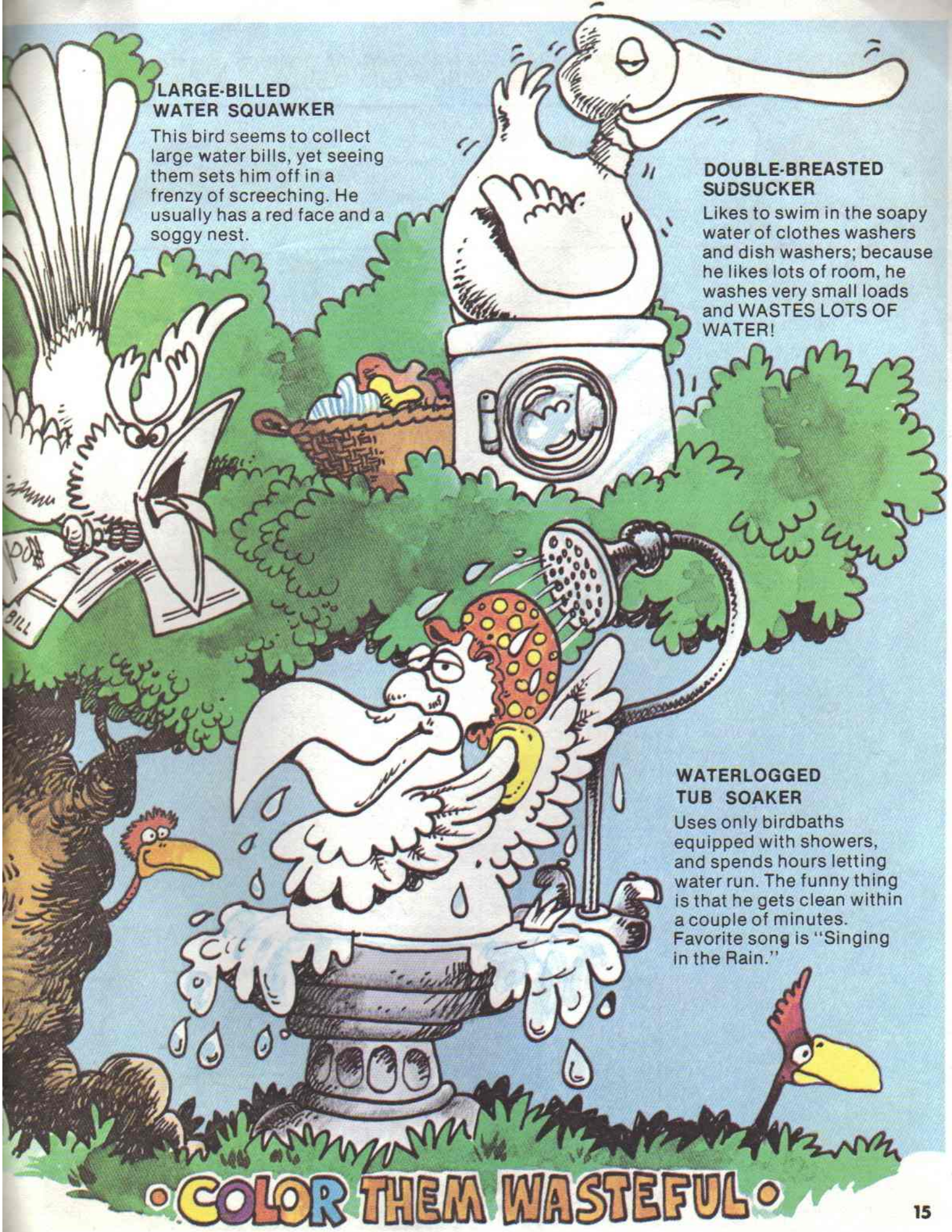


RUDDY-NOSED GUTTER FLOODER

Nests near hoses, especially in front yards attracted by the sound of gurgling water running over pavement. This bird loves to leave water running too long while car washing or lawn watering.

CHROME-HEADED PLUMBINGBIRD

Lives on the edge of sinks, where faucet-like beak can continually drip. Easily recognized by worn washer in throat. Closely related to the Dripless Sinkside, which has a good throat washer and SAVES WATER!


LARGE-BILLED WATER SQUAWKER
This bird seems to collect large water bills, yet seeing them sets him off in a frenzy of screeching. He usually has a red face and a soggy nest.
DOUBLE-BREASTED SUDSUCKER
Likes to swim in the soapy water of clothes washers and dish washers; because he likes lots of room, he washes very small loads and WASTES LOTS OF WATER!
WATERLOGGED TUB SOAKER
Uses only birdbaths equipped with showers, and spends hours letting water run. The funny thing is that he gets clean within a couple of minutes. Favorite song is "Singing in the Rain."
BILL
• COLOR THEM WASTEFUL •

WATERS OF CALIFORNIA HIDDEN NAMES PUZZLE

Hidden in the puzzle below are 56 water names of California. They include natural and artificial lakes and waterways which are components of the State's water system. Many of them can be found on the maps on pages 6 and 8. First study the list of the names provided beneath this picture of me and then try to locate them in the puzzle. NOTE: Only the proper part of the name has been used; for example, only SACRAMENTO is used, not River. The names may be spelled out forwards, backwards or on the diagonal. When you have found a name, circle it.

I	N	C	O	M	C	H	O	W	C	H	I	L	L	A	D	L	A	S
H	T	A	M	A	L	K	R	M	O	K	E	L	U	M	N	E	F	E
M	T	K	I	N	G	S	D	O	E	G	S	E	N	M	U	S	O	C
A	Z	A	S	U	C	C	E	S	S	L	T	H	G	I	R	B	N	P
B	B	W	R	B	N	H	P	L	C	O	U	C	M	P	C	Q	A	Y
U	D	E	E	L	S	I	N	O	R	E	H	T	A	E	F	I	C	R
Y	W	A	T	E	R	S	O	F	C	A	L	I	F	O	R	N	I	A
U	H	H	A	J	T	I	D	E	A	N	S	W	L	H	E	C	R	M
K	S	C	W	V	M	E	A	P	A	N	I	T	S	A	S	O	E	I
N	A	Y	T	I	N	I	R	T	T	H	O	A	C	T	N	A	M	D
I	N	N	E	E	G	X	O	M	O	U	N	Q	A	O	O	C	A	I
U	A	A	E	C	H	T	L	R	I	T	O	N	C	D	T	H	L	U
Q	N	I	W	K	P	H	O	G	A	N	I	L	H	N	L	E	L	O
A	T	S	S	X	R	V	C	C	O	S	U	W	U	E	A	L	A	T
O	O	S	Y	A	I	V	L	T	L	Q	T	S	M	M	S	L	S	N
J	N	U	C	L	R	A	R	A	E	B	Z	R	A	A	N	A	A	E
N	I	R	L	I	R	E	U	Q	E	H	C	X	E	T	U	E	T	I
A	O	E	J	A	L	S	V	I	S	A	B	E	L	L	A	S	I	M
S	A	N	I	L	A	S	H	A	S	T	A	L	F	E	N	I	P	I
F	Y	L	I	V	J	S	A	N	L	U	I	S	E	D	K	M	V	C
B	D	M	A	S	E	L	E	G	N	A	S	O	L	K	E	R	N	A
H	N	H	P	O	T	N	E	M	A	R	C	A	S	N	E	W	O	N

ALL AMERICAN Canal
AMERICAN River
BEAR River
CACHUMA Reservoir
CALAVERAS River
CALIFORNIA Aqueduct
CHOWCHILLA River
COACHELLA Canal
COLORADO River
COSUMNES River
DELTA MENDOTA Canal
DON PEDRO Reservoir
EEL River
ELSINORE Lake
EXCHEQUER Reservoir
FEATHER River
FOLSOM Reservoir
FRESNO River
Lake HAVASU
HETCH HETCHY Aqueduct
HOGAN Reservoir
ISABELLA Reservoir
KAWEAH River
KERN River
KINGS River
KLAMATH River
LOS ANGELES Aqueduct
MERCED River
MILLERTON Lake
MOKELUMNE River
NACIMIENTO Reservoir
NAPA River
OROVILLE Reservoir
OWENS River
PINE FLAT Reservoir
PIT River
PYRAMID Lake
RUSSIAN River
SACRAMENTO River
SALINAS River
SALTON Sea
SAN ANTONIO Reservoir
SAN JOAQUIN River
SAN LUIS Reservoir
SANTA CLARA River
SHASTA Reservoir
STANISLAUS River
SUCCESS Reservoir
SWEETWATER Reservoir
Lake TAHOE
TERMINUS Reservoir
TRINITY River
TULE River
TUOLUMNE River
TWITCHELL Reservoir
YUBA River

And so, my dear friends, we have travelled together through the wonders of western water, discovered how nature rides her water cycle, and gotten a few tips on how to save the wet stuff for an unrainy day.
Do me, and everybody else, a BIG favor...pass the word... there's never enough water to waste.